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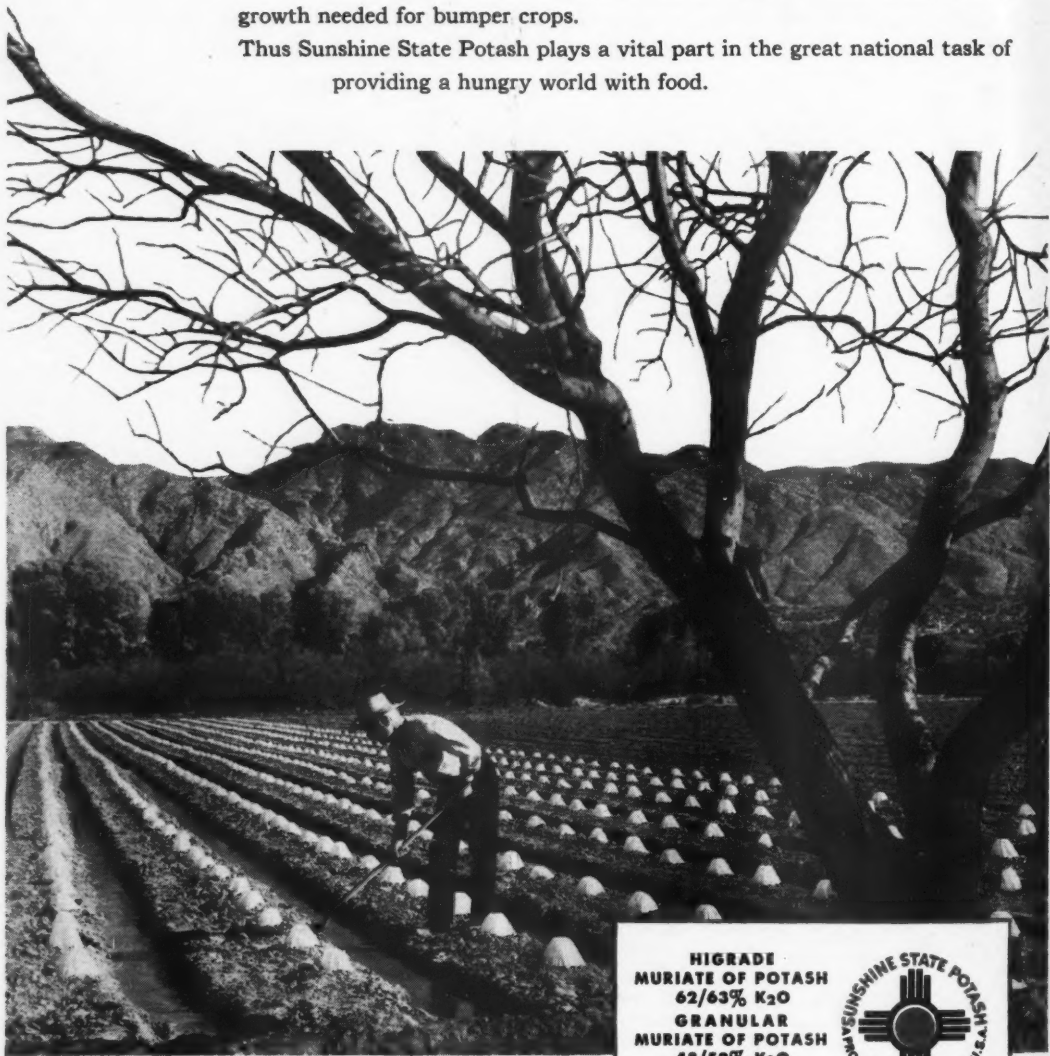
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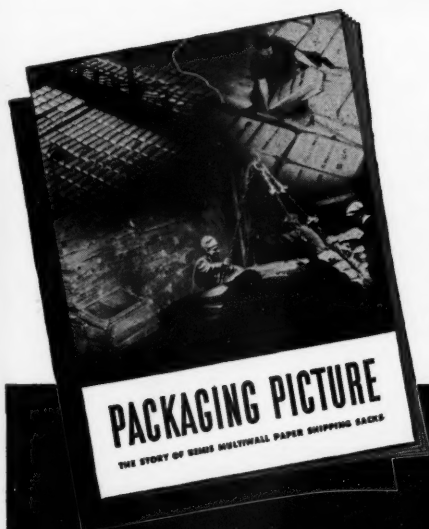
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| 11—14 | 1.22 lbs. |
| 14—15 | 1.13 lbs. |
| 16—18 | 1.01 lbs. |

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The American FERTILIZER

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JUNE 1, 1946

No. 11

The Nitrogen Problem in Soil Management

By F. W. PARKER

*Assistant Chief of Bureau of Plant Industry, Soils, and Agricultural Engineering,
U. S. Department of Agriculture*

NITROGEN is the most commonly deficient nutrient in the arable soils of the world. Wherever crops are harvested there is a problem of providing an adequate nitrogen supply. It is a problem on the alluvial soils of the Nile, the Ganges, and the Mississippi; the irrigated soils of Asia and western United States; the soils of the tropics, the coastal plains, and prairies. We may ignore the problem as is done in many places and take the consequences in declining yields and soil depletion. We should, however, adopt soil management practices to provide the nitrogen required at the right time and in the amount needed for efficient crop production.

The nitrogen problem engaged the attention of the early agricultural scientists of Europe and America. A large part of the early work of Rothamsted was directed to the study of nitrogen. From early days to the present, one of the major purposes of liming and mineral fertilization was to introduce nitrogen into the rotation through the growth of legumes. Only within the last century have chemical nitrogen fertilizers been used to supplement the nitrogen from the soils, legumes, and manures. Within the last 25 years a world nitrogen industry has developed and world consumption of chemical nitrogen fertilizers increased from 720,000 tons nitrogen in 1913 to 2,766,000 tons in 1937. The recent war caused an expansion of the industry

in some countries and its destruction in others.** As the world emerges from the war facing a food shortage, great agricultural countries, China, India, East Indies, and Egypt, are building or plan to build plants for the production of nitrogen fertilizers as one means of increasing food production and raising living standards. In the United States fertilizer nitrogen consumption increased 50% during the war. We have a potential production capacity in excess of our present or estimated future requirements. In view of the importance of nitrogen and the changing picture of nitrogen supplies in this and other countries, it seems appropriate that we as agronomists consider the broad aspects of the nitrogen problem this evening.

I do not wish to imply that a solution of the nitrogen problem is a panacea for agriculture. This problem is no more important than those associated with other nutrients and the physical properties of the soil. As a matter of fact, it cannot be solved without also finding the solution of many of the problems associated with the utilization of lime and mineral nutrients. Their effective use is essential for the biological fixation of nitrogen and the efficient use of nitrogen in manures

**In this connection it is of interest to note that one-half of the pre-war world production of nitrogen fertilizers was in Germany, Italy, and Japan, including Korea and Manchuria. With most of that capacity destroyed or shut down we should not be surprised at the acute world shortage of nitrogen. The slow conversion of our war plants to fertilizer production has not helped the situation. The net result is a world shortage of almost a million tons of nitrogen for the current season.

*From the presidential address delivered at the annual meeting of the American Society of Agronomy in Columbus, Ohio, February 28, 1946.

and fertilizers. I do want to emphasize that if we are to develop soil management practices that will insure a sustained high level of production we must provide an adequate supply of nitrogen in the cropping system. In what follows, I shall discuss some of the factors in the problem that I believe merit more attention.

Resources and Supplies

Our most important supply of nitrogen is that contained in soil organic matter. This nitrogen—for all practical purposes the total supply in soils—is the keystone in nitrogen management on most soils. It is nitrogen to be used, not hoarded. Large or small and of different degrees of availability, it represents working capital. We use it for producing crops and return part of that used to the soil in the form of crop residues and manure. In this transaction there is a net loss from the soil.

Stallings (6)* estimates that the harvested portion of all crops in 1943 contained 5,000,000 tons of nitrogen. The livestock and livestock products sold from farms in 1943 contained an estimated 870,000 tons nitrogen. These estimates serve to show the magnitude of some of the nitrogen losses from our soils. Some of the nitrogen in the first figure is returned to the soil, but the net loss must be measured in millions of tons. In addition there are the great losses from leaching and erosion. Losses of organic matter through erosion mean almost directly proportional losses of nitrogen.

The nitrogen content of many of our soils is not large, less than 1,000 pounds per 2,000,000 pounds of surface soil in extensive areas of the East, South, and West. Only in some soils formed under grass do we have really large reserves of nitrogen. Because of the limited supply and availability of nitrogen in soils and the indicated losses from cropping and erosion, it is necessary to provide substantial additions of nitrogen and to increase or renew soil reserves as much as possible.

The increased supply of nitrogen in the cropping system must come from two major sources, biological fixation and nitrogen fertilizers. The maintenance of existing supplies is promoted by several sound practices, including the conservation of crop residues and farm manures, use of cover crops, and the control of erosion.

There may not be much point in trying to estimate the quantity of nitrogen added to our soils from these sources. We should, however, know their relative magnitude.

*Figures in parenthesis refer to "Literature Cited,"

Legumes constitute our major source of nitrogen. They furnish far more nitrogen than farm manures and fertilizers combined. The nitrogen returned in farm manure exceeds by 50% the record quantity of fertilizer nitrogen used in the last year. This consideration of the magnitude of nitrogen additions from different sources gives us a perspective for considering some parts of the management problem. We must realize however, that the relative importance of these sources varies widely in different parts of the country and on different farms in a community. Their relative importance is subject to constant change.

Statement of the Problem

The problem may be stated as follows: What combinations of management practices will most economically meet the crop's nitrogen requirements, maintain soil organic matter, and assist in the conservation of nutrients and the control of soil erosion? Stated broadly, we are concerned with the management practices that involve the addition of carbon and nitrogen to the soil as a means of maintaining soil organic matter and an adequate supply of nitrogen for high levels of crop production. The major practices are the use of legumes to furnish both carbon and nitrogen, the use of close growing nonlegumes, with or without supplementary nitrogen, the handling of crop residues and farm manure, and the direct use of nitrogen fertilizers.

Determine Nitrogen Status of Farm Soils

One of the important steps in an investigation of this subject is to ascertain the nitrogen, organic matter, and physical status of the soils on farms in a region. The data should be studied in relation to soil types, cropping systems, and soil management practices. Most of the quantitative data on this phase of the problem have been limited to controlling long-time experiments. Such data are unquestionably valuable and essential to the study. They should be supplemented with similar data from a large number of farms. The procedure used in the studies reported at this meeting on the nutrient status of soils in certain areas of seven states seems well adapted for investigations of this character.* (7)

The data secured would give a dependable picture of the distribution of nitrogen and organic matter levels, trends in fertility, and changes in physical properties, as related to soil types, cropping systems, and management practices. This would emphasize the value and applicability of the long-time experiments

and might also indicate shortcomings of such work.

Importance of Root Residues

On most of our crop land the root residues constitute an important source of organic matter. A comparison of the weight and nitrogen content of some of our important crops indicates their relative contribution to maintaining fertility. One group, of which corn, cotton, and wheat are examples, has less than 1,000 pounds of roots per acre and those are normally low in nitrogen. Red clover has a larger root system and it is high in nitrogen, with a C/N ratio of about 20. Two- or 3-year-old alfalfa usually has a considerably greater weight of roots than red clover and they are equally high in nitrogen. Bluegrass and timothy may have an even greater weight of roots than alfalfa, but the C/N ratio is usually high. Kudzu, one of the best soil-improving crops in the South for certain purposes, has a very extensive and deep-root system rather high in nitrogen. That may explain the observation of workers (1) at the Alabama Experiment Station that for the 10 years after turning 3-year-old kudzu, the yield of oats, corn, and sorghum was double that on a no-kudzu plot.

It is well established that extensive root systems have an aggregate effect on soils and are a major factor in improving soil structure. When this action is combined with a high nitrogen content, one has about the ideal soil-improving crop. We know alfalfa properly limed and fertilized is one of the best crops to include in a rotation. Obviously we must consider root residues in evaluating soil-improving crops.

Before leaving this phase of the subject, attention should be directed to the need of more data on the extent and composition of the root system of crops. What variations are encountered on different types and at different levels of fertility? What are the variations between crop varieties?

Adjusting C/N Ratio in Crop Residues

Data on bluegrass and timothy show that while the root systems are extensive the C/N ratio is usually high. This is true for the crop residues of most nonlegume and even some legume crops. Those residues constitute a major source of organic matter. Are they being effectively utilized?

It is well established that in the decomposition of such residues carbon losses are high unless there is an adequate supply of nitrogen. Some investigations (5) indicate the soil organic matter formed from the addi-

tion of straw or corn stover can be doubled by the addition of nitrogen. The needed nitrogen may be in the soil, but it probably is not. Forty years ago Corn Belt soils probably contained the available nitrogen. Many of them do not today. There is not much available nitrogen left after growing a 75 to 100 bushel crop of hybrid corn.

Is it a good investment for a farmer to purchase nitrogen as a means of increasing the organic matter or humus secured from many crop residues? Is a ton of additional organic matter worth the investment represented by 75 to 100 pounds of nitrogen? Of course the nitrogen used in forming the organic matter is not lost, but it is only slowly available to succeeding crops. It constitutes a reserve and would represent a step in restoring native fertility.

In our consideration of the use of nitrogen fertilizers we have usually looked for returns on the crop fertilized. That is all right in many respects, but we should go further. When used with carbonaceous crop residues, including root systems of grass and non-legume cover crops, nitrogen reserves can be increased. The process is different, but the net result is similar to the reserves of phosphate we are compelled to establish when we use phosphoric fertilizers. To a greater extent than the phosphate reserves, the nitrogen builds organic matter to improve the physical properties of the soil.

The practical application of this principle, the use of nitrogen with carbonaceous crop residues to build organic matter and nitrogen reserves, will vary widely under different conditions. In the Corn Belt it may be chemical nitrogen with corn stover, straw, and grass sods. In the Cotton Belt it may be legume-small grain mixtures for winter grazing, cover crops, and green manuring, or it may be small grains with chemical nitrogen. In the more intensive trucking areas along the Atlantic Coast, catch crops of small grains with chemical nitrogen are extensively used. The application of the general principle in the Great Plains is complicated by moisture relationships, but its applicability needs to be determined.

There is great need for both fundamental and applied research in this field. The fundamental research would relate to the biochemistry of carbon and nitrogen in soils. Our knowledge of the chemistry of soil organic matter has not advanced as rapidly as that relating to clay minerals. What compounds are we dealing with in soil organic matter? How do they vary with

(Continued on page 28)

United Nations Committee Presents World Fertilizer Situation

Present Demand Indicates Serious Shortage in Nitrogen and Phosphates. Prospects for 1949-50 Show Continued Shortage Unless Production Facilities Are Renewed and Additional Operations Commenced

AT THE recent meeting of the Food and Agriculture Organization of the United Nations, held in Washington on May 20th, a comprehensive report on the world fertilizer situation was presented to the delegates. The following are extracts, as summarized by the American Plant Food Council, from the report dealing with the current situation and the problems which the industry will have to meet during the next few years.

Current Fertilizer Outlook Summarized

Preliminary estimates of the amounts of chemical fertilizers which may be available for crops to be harvested in 1947 indicate that there may be fairly substantial increases for all three plant nutrients as compared with the amounts applied to crops to be harvested in 1946; but there will still be a deficiency of some 30 per cent in the supplies of nitrogen and soluble phosphates and some 5 per cent in the supplies of potash, judging from the requests of countries now before the Committee on Fertilizers of the Combined Food Board.

Fertilizer allocations (of the Combined Food Board) for 1945-46 and estimates for 1946-47 together with the pre-war data are summarized in the following table:

| | Pre-war produc- tion | Alloca- tions 1945-46 | Estimates for 1946-47 | |
|---------------------------------|----------------------------|-----------------------------|--------------------------|--------|
| | | | Produc- tion | Demand |
| Nitrogen (N) | 2.2 | 1.6 | 2.4 | 3.3 |
| Phosphoric Acid (P_2O_5) | 3.4 | 3.1 | 4.1 | 5.5 |
| Potash (K_2O) | 2.4 | 2.1 | 3.2 | 3.3 |

The 1945-46 and 1946-47 figures are subject to revision, especially in the case of phosphate, for which the 1946-47 figures are based largely on the demand for an estimated production of phosphate rock.

To reach the estimated production levels for 1946-47 favorable conditions will have to be prevalent throughout the world. For instance, it has been assumed that Germany will produce 200,000 tons and Japan 260,000 tons of nitrogen. It is doubtful if these figures will be realized. Similarly, for potash

production to reach 3.2 million tons of K_2O for 1946-47, Germany's output during the coming year will have to be 1.5 million tons, a figure that may be altogether too optimistic.

Substantial increases in nitrogen output could be realized if the nitrogen-production capacity in Germany and Japan were fully used. Some 400 to 500 thousand tons more nitrogen per annum could also be produced if the full synthesizing capacity of the U. S. Government nitrogen plants were utilized; but before this could be done, additional equipment and additional facilities for converting the raw ammonia to fertilizer material would have to be installed.

In general the fertilizer picture indicates that supplies will be short in every major producing area in the world, with the demands or stated requirements of the United States and Canada being more nearly met than those for any other sizable area in 1946-47.

Stated United Kingdom and European demands for 1946-47 for the three plant nutrients are substantially above pre-war levels. It is extremely doubtful that these demands can be met. One of the chief problems is the extent to which the fertilizer industry in Germany will be rehabilitated. Supplies of basic slag, which before the war was a very important source of agricultural phosphate in Europe, are also expected to continue to be extremely short through 1946-47.

In Australia, New Zealand, and the Union of South Africa it is phosphates that are chiefly required. Before the war the phosphate rock deposits at Nauru and Ocean Islands were by far the most important sources of phosphates for Australia and New Zealand. Owing to war damage, the output of rock from these two sources will be only a fraction of what it was before the war. Thus these two countries are obliged to continue presenting heavy claims on other supply areas.

In China, Egypt, India, Korea, and the Netherlands East Indies, nitrogen is the great problem. With negligible indigenous production of this plant nutrient, these countries have to depend on what exporting countries can spare them. Importation of large quantities

of the three plant nutrients into Japan is considered necessary by the U. S. A. controlling authorities.

World Prospects for Fertilizer Production for 1949-50

During the period of hostilities many of the fertilizer-producing plants, mines and port installations have been damaged in various parts of the world. It will take a period of time to get these into smooth running order. The worn-out equipment will have to be renewed. However, two or three years after 1947 fertilizer production conditions may be expected to improve.

Nitrogen

If the United States were to employ at full rate the industrial facilities she is now using for production of nitrogenous fertilizer, she could probably produce some 600,000 metric tons of nitrogen per annum. The United States intends to produce 514,000 metric tons of nitrogen for the 1946-47 fertilizer year. This figure includes the production of four of the nine government nitrogen plants.

Let us now summarize the different levels of the world nitrogen fertilizer annual production as visualized for 1949-50:

World nitrogen installation minus German and Japanese facilities, and with U. S. A. utilizing a part of her government nitrogen plant synthesizing facilities, 2,620,000 metric tons.

World nitrogen installations minus German and Japanese facilities and with U. S. A. utilizing her full nitrogen synthesizing capacity, 3,020,000 metric tons.

All nitrogen fertilizer installations of the world at full production, 4,020,000 metric tons.

The three levels suggested, however, can only be reached if the installations concerned are in good running order and there is no scarcity of the raw materials required, such as coal, etc. If one compares these figures with the world's estimated demand for nitrogen (3.3 million metric tons) for the fertilizer year 1946-47, it will be seen that the possible world production of nitrogen will still not meet the demand.

It should be pointed out that even 4,020,000 tons of nitrogen is a long way from the requirement of that plant nutrient for optimum food production of the world. To improve the general standard of crop production and to bring the crop yields in less developed countries such as India, China, and Netherlands East Indies, more in line with those of the

more progressive countries, the world's annual requirement for nitrogen would be of the order of 9 to 10 million tons.

Phosphates and Phosphate Rock

The phosphate position is dependent upon: (a) supplies of phosphate rock; (b) facilities for processing phosphate rock into soluble forms; (c) steel production program with basic slag or scories as a by-product.

Phosphate Rock.—The following quantities of phosphate rock can be expected to be produced annually if there is a demand for it:

| PHOSPHATE ROCK PRODUCTION | |
|---|---------------------------------|
| Country | Production 1,000 metric tons |
| U. S. A. | 6,000 |
| Curacao | 100 |
| North Africa | 5,000 |
| Egypt | 500 |
| Islands of Nauru, Ocean, Maketea and Christmas | 1,700 |
| Japanese Islands | 400 |
| | <hr/> 13,700 |

If the demand is persistent, some of these sources such as the United States, North Africa and possibly Egypt could probably increase their annual production so as to furnish an extra 1,000,000 tons of rock annually. In the past, the U. S. S. R. has been known to export some 800,000 metric tons of phosphate rock per annum. She could probably export as much as a million tons in the future. Thus, if there were a persistent demand for phosphate rock some 15,700,000 tons of it could be produced annually by 1949-50.

If one compares the world production figure for phosphate rock as visualized for 1949-50 with the estimated and indicated demand figure for that commodity for the fertilizer year 1946-47 (14,500,000 tons), it will be noted that there is not much reserve in production for any increase in demand. (Note: 15,700,000 metric tons of phosphate rock is roughly equivalent to 4,700,000 tons of P_2O_5 .)

Soluble Phosphates.—The total amount of soluble phosphate fertilizer material that can be expected to be produced per annum is some 23,500,000 tons. (This does not include the plant capacity of U. S. S. R.) The production of this quantity pre-supposes the smooth running of all phosphatic plants throughout the world. (Note: 23,500,000 tons of phosphate fertilizer materials is equivalent to about 4,000,000 metric tons of P_2O_5 .)

In the preceding paragraph on phosphate rock it is estimated that in 1949-50 the world

(Continued on page 30)

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A. A. WARE, Editor
C. A. WHITTLE, Associate Editor
K. F. WARE, Advertising Manager
E. A. HUNTER, Southern Advertising Manager
2246 E. Lake Road, N. E.,
Atlanta, Ga.

REPRESENTATIVES
WILLIAM G. CAMPBELL
123 W. Madison St., Chicago, Ill., Phone—Randolph 4780
ROY M. McDONALD
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N. F. A. Convention

The 1946 Annual Convention of the National Fertilizer Association will be held at French Lick Springs Hotel, French Lick, Ind., on June 10th, 11th and 12th.

The first day, Monday, June 10th, will be devoted to the committee meetings. The Board of Directors will meet in the morning at 10 o'clock. In the afternoon at 3 o'clock the Plant Food Research Committee will hold a session to which association members are invited.

The two general sessions of the convention will be held on Tuesday morning, June 11th and Wednesday morning, June 12th at 10 o'clock. The program will be opened with an address by Maurice H. Lockwood, chairman of the board, and president-elect, who will review the present situation in the industry and the program of the association. There will also be talks by Dr. Harry J. Reed, Director of the Indiana Agricultural Experiment Station; C. T. Prindeville, of Swift & Co., chairman of the Association's Public Relations Committee; Hugh Craig, editor of *Oil, Paint and Drug Reporter*; James Stillwell, U. S. Department of State; John T. Mapes, of Hill and Knowlton, public relations counsel; H. B. Siems, chairman of the Plant Food Research Committee.

On Wednesday, June 12th, the election of three directors-at-large and of six district directors will be held. The directors whose terms expire are as follows:

At Large

M. H. Lockwood, Eastern States Farmers Exchange, West Springfield, Mass.; John E. Powell, Smith Agricultural Chemical Co., Columbus, Ohio; Louis Ware, International Minerals & Chemical Corp., Chicago, Ill.

District

F. N. Bridgers, (4), Farmers Cotton Oil Co., Wilson, N. C.; W. H. Gordon, (2), Chamberlin & Barclay, Inc., Cranbury, N. J.; L. D. Hand, (6), Pelham Phosphate Co., Pelham, Ga.; Weller Noble, (12), Pacific Guano Co., Berkeley, Calif.; Enos Valliant, (3), Dorchester Fertilizer Co., Cambridge, Md.; M. H. Whipple, (1), Olds & Whipple, Inc., Hartford, Conn.

The afternoons of each convention day will be devoted to the National Fertilizer Association Golf Tournament, which will be in charge of Ray L. King, of Georgia Fertilizer Com-

pany. A well-rounded series of contests has been arranged.

The annual ladies' bridge party will be held on Tuesday afternoon, under the direction of Mrs. Burton A. Ford, of New York City.

Lockwood Elected President of National Fertilizer Association

The Board of Directors of the National Fertilizer Association has announced the election of Maurice H. Lockwood as President of the Association. He will take office on July 1st and will assume executive direction at Washington, devoting his entire time to the affairs of the N. F. A.



Maurice H. Lockwood

One of the best informed and most popular figures in the fertilizer world, Mr. Lockwood has long been identified with N. F. A.'s activities. He has been a Director of the Association since 1940, a member of its Executive Committee since 1943, and Chairman of the Board during the current year.

From the time of his graduation in Agriculture from the University of Connecticut, he has been actively engaged in agricultural service. He first served as a County Agent, then as manager of a farmers' cooperative

fruit marketing organization, and more recently as Fertilizer Research Manager of the Eastern States Farmers' Exchange, West Springfield, Mass., with which he has been associated for twenty years.

During the war he was a member of the WFA Fertilizer Industry Advisory Committee which worked closely with Government agencies in advising them with respect to the nation's fertilizer policies. Although staunchly opposed to Government intrusion in the field of fertilizer production and distribution he has worked closely with Federal, state, and county agencies such as the Bureau of Plant Industry, the State Experiment Stations, and the Agricultural Extension Service, in their research and educational activities with respect to soils and fertilizers.

In his work with Eastern States Farmers' Exchange, the new president-elect has been keenly interested in the improvement of fertilizers, and was among the first of those in the industry who recognized and put into regular use soil and plant tissue tests as constructive tools in sound fertilizer usage recommendations. He has followed fertilizer plants from the blueprint to the operational stages, and has promoted the use of modern equipment for handling and processing fertilizer mixtures, including the use of new materials and rotary coolers for use in connection with blending done with heavy rates of ammoniation. He has made visits to fertilizer plants throughout the country and has first-hand knowledge of the nitrogen, phosphate, and potash industries.

Mr. Lockwood, 46 years of age, is the author of numerous articles on fertilizers and their use, is well known and highly regarded among the agronomists and soil chemists of the United States and is also an authority on the plant-food situation throughout the world. In 1935 he attended the International Soils Conference at Oxford, England, and has traveled in Europe and Central America. While in Europe he visited fertilizer plants in Holland and Germany. He is a member of the American Association for the Advancement of Science, the American Society of Agronomy, the American Chemical Society, and the International Soil Science Society.

The Virginia-Carolina Chemical Corporation has reported that all of its employees who had entered the Armed Forces have returned to duty. Among these are Edwin Cox, general manager, and William T. Thomas, assistant sales manager of the Southern area.

American Plant Food Council Convention

The First Annual Convention of the American Plant Food Council will be held at The Homestead, Hot Springs, Va., on June 23rd, 24th and 25th.

The only events scheduled for Sunday, June 23rd, are meetings of the executive committee at 4 P. M., and of the Board of Directors at 7:30 P. M.

On Monday, June 24th, the first session of the Convention will open with an address by President C. A. Woodrum and the report of Harry B. Caldwell, Secretary-Treasurer.

These will be followed by an address by Dr. Richard Bradfield, who will speak on the subject, "What is the Responsibility of the Fertilizer Industry in the Post-War Period?" There will also be brief talks by W. A. Minor, Special Assistant to the Secretary of Agriculture, and by Congressman Stephen Pace of Georgia.

The annual dinner will be held on Monday evening at 7 P. M., the principal speaker being Congressman Everett Dirksen of Illinois.

The program on Tuesday, June 25th, will be started with an interesting innovation, an agricultural breakfast, to be held at 7:30 A. M. The discussion will be led by Dr. Paul Sanders, editor of *The Southern Planter*. His subject will be "The Importance of Agriculture in Our Economy."

The convention will again convene at 10 A. M. Following talks by Dr. R. M. Salter, of the United States Department of Agriculture, and by Wheeler McMillan, editor of *The Farm Journal*, there will be a showing of a plant food picture entitled "This is Our Land," made by the Petroleum Institute in collaboration with the Soil Conservation Service. Following the picture there will be the election of directors and other business.

An enjoyable program of entertainment has been arranged which will occupy the afternoon of each day. The golf tournament with a number of interesting events for which handsome prizes will be awarded, will be in charge of Albert B. Baker, of Bradley and Baker, New York City.

Entertainment for the ladies will consist of bridge, bingo and putting contests, for which attractive prizes will be offered. The ladies' committee will be in charge of Mrs. Harry B. Caldwell, chairman.

Taylor and Wilson Join American Plant Food Council Staff

Appointments of Dr. John R. (Dugan) Taylor of Richmond, Va., as agronomist and Louis H. Wilson of Washington, D. C., as director of information for the American Plant Food Council was recently announced by Clifton A. Woodrum, president of the Council.

Prior to accepting positions with the Council, Dr. Taylor was agronomist for the Virginia-Carolina Chemical Company of Richmond and Wilson was director of public relations for the National Grange.

Dr. Taylor, a native of Buffalo, Ala., received his B.S. degree in agriculture at Alabama Polytechnic Institute at Auburn in 1929; received his M.S. degree at West Virginia University at Morgantown in 1935 and obtained his Ph.D. in soil chemistry at the University of Wisconsin at Madison in 1937. After graduation, he held positions at the Alabama Agricultural Experiment Station at Auburn as assistant in agronomy and as assistant soil chemist, conducting extensive research in the field of soils, fertilizers and crops. He is a member of Sigma Xi national honorary research society, Phi Kappa Phi honorary scholastic fraternity, Gamma Sigma

(Continued on page 26)

BRADLEY & BAKER

FERTILIZER MATERIALS - FEEDSTUFFS

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504 Merchants Exchange Bldg., St. Louis, Mo.

FERTILIZER MATERIALS MARKET

NEW YORK

Prospects for Next Year's Supplies of Fertilizer Materials Are Not Bright. Price Increase Asked on Some Materials. Coal Strike Reduces Further the Output of Sulphate of Ammonia. Higher Ceilings on Organics Does Not Affect Fertilizer Situation. Phosphate Rock Still in Short Supply

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, May 27, 1946.

With the passing of the peak of the fertilizer mixing season in most areas the demand for raw materials has slackened considerably. Fertilizer manufacturers' interest in the market at this time is confined mostly to the possibility of obtaining adequate supplies for the new season. The outlook for 1946-47 is not encouraging in this respect as it is generally conceded that the supply position of the major plant food materials will remain as tight, and will probably become even tighter than during this past period. No new price schedules have been published as yet by any of the producers of basic materials, but rumors of various price increases lend further uncertainty to present market conditions.

In view of continued shortages the committee on fertilizers of the Allied Combined Food Board will continue to allocate materials to insure an equitable distribution to deficient areas throughout the world. From present indications it is judged that there will be a world-wide deficiency of about 30 per cent in the supplies of nitrogen and phosphate, and approximately 5 per cent in the supplies of potash. This estimate is based upon the requests of various countries now before the Combined Food Board for allocations during the 1946-47 season, but a more rapid rehabilitation of the foreign fertilizer industry may change the picture considerably. Generally speaking, the fertilizer situation indicates that there will be a shortage of supplies in practically every producing area in the world, and requirements of North America will be more nearly met than those of any other major consuming center.

Imports continue to be non-existent and, in fact, the market is completely lacking in offerings of any kind at present. Export inquiry remains heavy and unfilled.

Sulphate of Ammonia

The situation here has gone from bad to worse with a further reduction in available supplies as a result of the current coal strike. There can be no doubt that this and other strikes in the past few months have cut production to the point where supplies during the new season will remain extremely tight. The Office of Price Administration has been approached by ammonium sulphate producers to increase ceiling prices and requested increases have ranged from \$4 to \$8 per ton. This matter is currently under discussion, but no definite announcement has been made to date.

Ammonium Nitrate

It is to be noted that the government-owned nitrogen plant in El Dorado, Ark., has been taken over by a private operator, who will produce nitrogen fertilizers. Facilities at this plant can produce annually 165,000 tons of ammonium nitrate and 90,000 tons of anhydrous ammonia. It is hoped that similar developments will ensue in other government nitrogen plants, thus aiding in filling the unprecedented demand for agricultural nitrogen.

Nitrate of Soda

Demand for this material has eased off and, with further arrivals from Chile scheduled in the near future, demand should be adequately taken care of for the next few months.

Organic Materials

No new developments to report in this market as lack of supplies has completely eliminated any possible trading. The recent raising of the ceiling on fish meal by \$10 a ton has had no effect in the fertilizer market as supplies had been previously going to the feed manufacturers, and this will undoubtedly continue to be the case. The ceiling price on tannage was also advanced by \$7.50 per ton,



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Equipment that increases volume without increasing man-power is what production men want. EXACT WEIGHT Scales do this without lost motion, double handling and extra check-weighing by filling, weighing and checking in one fast operation. This assures more sacks per ton from bulk . . . more sacks per man hours . . . around the clock EXACT WEIGHT operation. Such mechanical features as the famous lock-jaw bagholder, dust exclusion dashpots and improved cut off valves guarantee the trouble-free operation you need. Write for full details for your plant.

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and no appreciable change in the supply position of this material has resulted.

Superphosphate

In spite of continuing record production, demand is far in excess of available supply, and it is generally believed that this condition will be prolonged through the coming fertilizer year. The determining factor continues to be the ability of acidulators to obtain additional phosphate rock.

Phosphate Rock

There has been no easing of pressure on producers for current shipments, and the same tight position currently prevails. It does not appear that North African material will be allowed to enter this market as all allocations by the Combined Food Board have been made to other countries.

Potash

Shipments against current contracts have been practically completed, and there does not seem to be any resale material available. Unless unforeseen complications arise in the meantime, there is every indication that domestic producers will be able to take care of agricultural requirements in this country during the coming year. It is thought unlikely that foreign potash will move to this market before another year at least.

CHICAGO

New Ceilings on Organic Materials Make Use in Fertilizers More Impractical. Inquiries on Materials Going Unaccepted

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, May 25, 1946.

No change in the organic situation is noticeable. News as to Milorganite is awaited.

The ceilings on tankage and blood used for feeds have been amended. Ceilings have been \$5.53 per unit ammonia, f. o. b. produc-

tion point and the amendment permits \$7.50 per ton additional irrespective of analysis. This makes these articles further removed from possible fertilizer use.

Inquiry for steamed bone, superphosphate and potash, continue appearing in the market with but little offered.

Ceiling prices are:

High grade ground fertilizer tankage, \$3.85 to \$4.00 (\$4.68 to \$4.86 per unit N) and 10 cents; standard grades crushed feeding tankage, \$5.53 per unit ammonia (\$6.72 per unit N) plus \$7.50 per ton; blood, \$5.53 (\$6.72 per unit N) plus \$7.50 per ton; dry rendered tankage, \$1.25 per unit of protein, plus \$7.50 per ton f. o. b. producing points.

CHARLESTON

Low Ceiling Prices Prevent Imports of Organics. New Prices on Chemical Materials Awaited. Phosphate Rock Still Tight

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, May 29, 1946.

Organics.—Organics remain exceedingly scarce and buyers are finding practically no offerings for next season. South American organics are still impossible because of low American ceilings, even if manufacturers are willing to pay higher prices.

Packing House Products.—Current production definitely unable to supply demand. South American supplies are kept out by low ceilings and fabulous prices paid by Europe. Blood has been sold in the Argentine equivalent to over \$9.00 per unit ammonia, c. i. f. U. S. ports.

Potash.—Production is slightly better and first quarter 1946 showed up with an increase over the first quarter of 1945. Buyers' demand remains very strong however. No decision as to whether to allocate potash has been announced as yet. Prices for next season also have not been announced as yet.

Manufacturers' Sales Agents for **DOMESTIC**

Sulphate of Ammonia

Ammonia Liquor :: Anhydrous Ammonia

HYDROCARBON PRODUCTS CO., INC.

500 Fifth Avenue, New York

Sulphate of Ammonia.—Stocks are extremely low and pressure has been applied to the OPA to allow \$4.00 to \$8.00 increase in price to up production. Rumor has it that price for coming season will be f. o. b. ovens and the port price basis eliminated.

Phosphate Rock.—Supplies remain short and producers are shipping from current production. The railroad strike further aggravated deliveries to superphosphate producers and, in addition, resulted in a current car shortage, further hampering deliveries.

Fish Scrap.—Little is available and offerings are practically nil. Feed manufacturers are getting most of what little fish catch there is.

PHILADELPHIA

Demand Still Exceeds Supply and Inquiries for Future Use Are Heavier than Usual. Railroad and Coal Strikes Further Complicated Situation

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, May 27, 1946.

There was slight relief in the shipping situation during the temporary raising of the embargo, but demand for almost everything exceeds the supply. Inquiries are more pronounced than is usual at this time of the year. Raising the ceiling prices for blood, fish scrap and tankage is not likely to increase the supply, and tends to further remove these organics from the reach of the fertilizer mixer.

Sulphate of Ammonia.—Reduced production keeps the supply position tighter than ever, and shipments are consequently behind schedule. There is still the possibility of price increase.

Nitrate of Soda.—Shipments are all on contracts and are behind schedule, with the demand exceeding the supply.

Castor Pomace.—There are no new offerings, and some shipments on contract are curtailed due to labor difficulties.

Blood, Bone, Tankage.—Situation remains as previously reported, in that the production is light and most of these organics go to the feeding trade. Raising the ceilings on blood, tankage, etc., does not help the fertilizer man. There has been a little movement in off-grade lots. There have been some South American offerings at prices almost twice our ceilings.

Phosphate Rock.—Market tight and no inventories. The present coal strike will have its effect.

Superphosphate.—Demand exceeds the sup-

Savings EFFECTED BY ST. REGIS PACKAGING SYSTEMS

CASE HISTORY #1 . . \$5.71 per ton

| | |
|---------------------------------|--------|
| saving on container..... | \$5.46 |
| saving on packaging operation.. | \$.25 |
| total saving..... | \$5.71 |

CASE HISTORY #2 . . \$2.50 per ton

| | |
|---------------------------------|--------|
| saving on container..... | \$1.32 |
| saving on packaging operation.. | \$1.18 |
| total saving..... | \$2.50 |

CASE HISTORY #3 . . \$1.80 per ton

| | |
|---------------------------------|--------|
| saving on container..... | \$1.64 |
| saving on packaging operation.. | \$.16 |
| total saving..... | \$1.80 |

CASE HISTORY #4 . . \$1.56 per ton

| | |
|---------------------------------|--------|
| saving on container..... | \$1.55 |
| saving on packaging operation.. | \$.01 |
| total saving..... | \$1.56 |

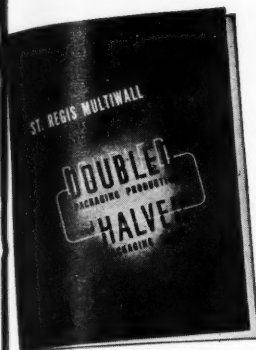
CASE HISTORY #5 . . \$5.06 per ton

| | |
|---------------------------------|--------|
| saving on container..... | \$3.56 |
| saving on packaging operation.. | \$1.50 |
| total saving..... | \$5.06 |

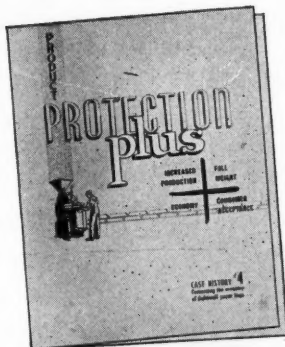
Multiwall paper bags are now serving American industry in high-speed machine packaging of over 300 different chemical, food, fertilizer and rock products. These five "case histories" outline the detailed factual experience of leading concerns in the use of fast, cost-saving St. Regis Packaging Systems.

**WATCH THESE PAGES FOR
FURTHER CASE HISTORIES**

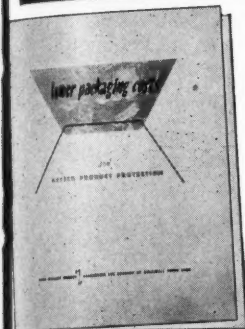
THESE "CASE HISTORIES" SHOW HOW ST. REGIS PACKAGING SYSTEMS INCREASE PRODUCTION — REDUCE PACKAGING COSTS



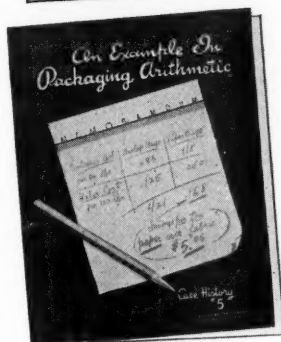
1 manufacturer of ready mixed cake flours . . . installation of a St. Regis Valve-bag Packaging System raised production from 9,000 lbs. per hour to 18,000 lbs. per hour with no increase in labor costs.



4 prominent salt manufacturer increased packaging output 18% with the same crew by changing over to the St. Regis Valve-bag Packaging System . . . and effected a saving of 45% in overall packaging costs.



2 several well-known fertilizer manufacturers were using eight men to pack burlap bags. St. Regis Valve-bag Packaging Systems enabled these companies to "up" production 20% per hour with only 5 men packing and handling.



5 manufacturer of cocoa installed a St. Regis Valve-bag Packaging System. Result: an increase of 62½% in production, a saving in labor costs of 60%, a saving in container costs of over 55%.



3 manufacturer of granite poultry grit formerly employed a 14-man crew to fill, sew and handle a maximum output of 60,000 lbs. per hour. Installation of a St. Regis Valve-bag Packaging System enabled poultry grit manufacturer to double production with smaller crew . . . reduce container costs 54.4%.

The "case histories" illustrated above have proved of great value to manufacturers throughout the country . . . perhaps they will be of equal value to your company. Write for the folders that interest you the most . . . or, if you would prefer to have a St. Regis sales representative talk over your specific problems with you, just 'phone or write your nearest St. Regis Sales Office.

Years of experience in the pioneering of automatic packaging in multiple-layer paper bags has enabled St. Regis to recommend the correct packaging system to suit the needs of manufacturers of over 300 different products including chemical, food, fertilizer and rock products. The coupon is for your convenience.



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SAN FRANCISCO 4: 1 Montgomery St.

Without obligation, please send me full details regarding "Case Histories" outlined above.

No. 1 ☐ No. 2 ☐ No. 3 ☐ No. 4 ☐ No. 5 ☐

Name

Company

Address

Birmingham Boston Cleveland Dallas Denver Detroit
Franklin, Va. Los Angeles Nazareth, Pa. New Orleans
No. Kansas City, Mo. Ocala, Fla. Oswego, N. Y. Seattle Toledo

IN CANADA: St. Regis Paper Co. (Can.) Ltd., Montreal, Vancouver.

ply and, of course, the strikes will interfere with production and shipment. It is reported that the production in March, 1946, was much in excess of March, 1945; that shipments were about one-third greater, while its use in mixed goods was over 20 per cent more than last year. Inventories at the close of March were the lowest in several years.

Potash.—While there is considerable demand, no resale lots are visible. The strikes are, of course, having their unfavorable effect. New prices are being awaited.

International Shareholders Approve Stock Sale

Stockholders of International Minerals & Chemical Corporation have approved the sale of 145,834 shares of \$5 par value common stock, according to an announcement by Louis Ware, president.

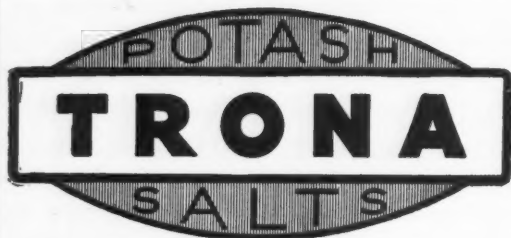
At the same time, approval was voted to issue rights to shareholders permitting them to subscribe to such shares on the basis of one share of the new stock for each five shares held. Holders of stock purchase warrants also will be permitted to subscribe to such

shares on the basis of one share for each five shares of common stock issuable upon exercise of the warrants held.

Of the total number of shares, 14,000 are reserved for purchase by officers and employees of the corporation at the market price on deferred payment terms.

White, Weld & Company will head the group of underwriters handling the subscriptions to holders of the common shares and stock purchase warrants. The subscription price has not yet been determined but upon determination by the board of directors announcement will be made in the public press.

The proceeds from the sale of the common stock are intended to be applied, together with other corporate funds to the extent necessary, to the construction and equipment of an amino products chemical plant for the production of mono-sodium glutamate, glutamic acid, betaine and other pharmaceuticals and food products at San Jose, Calif., at an estimated cost of approximately \$2,250,000, and to the development of a mine and construction and equipment of a mill and flotation plant upon phosphate property located near Bartow, Fla., at an estimated cost of approximately \$2,680,000.



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Our plant at Trona, Calif., is operating at capacity to provide supplies of these essential plant foods, and other materials needed in the national effort.

Manufacturers of Three Elephant Borax and Boric Acid

See page 27

A Complete Service

THE strategic factory locations of The American Agricultural Chemical Company, as shown on the accompanying map, assure prompt, dependable service for the complete line of products listed below.

We manufacture all grades of Commercial Fertilizers, Superphosphate, Agrinite Tankage, Bone Black, Bone Black Pigments (Cosmic Black), Bone Ash, Bone Oil, Dicalcium Phosphate, Monocalcium Phosphate, Gelatin, Agricultural Insecticides (including Pyrox, Arsenate of Lead, Calcium Arsenate, etc.), Trisodium and Disodium Phosphate, Phosphorus, Phosphoric Acid, Sulphuric Acid, Ammonium Carbonate, Ammonium Fluosilicate, Magnesium Fluosilicate, Potassium Fluosilicate, Phosphorus Pentasulphide, Phosphorus Sesquisulphide (lump), Zinc Fluosilicate, Salt Cake; and we are importers and/or dealers in Nitrate of Soda, Cyanamid, Potash Salts, Sulphate of Ammonia, Raw Bone Meal, Steamed Bone Meal, Sheep and Goat Manure, Fish and Blood. We mine and sell all grades of Florida Pebble Phosphate Rock.



FACTORIES

| | | |
|------------------------------|-----------------------|-----------------------|
| Alexandria, Va. | Cleveland, Ohio | No. Weymouth, Mass. |
| Baltimore, Md. | Detroit, Mich. | Pensacola, Fla. |
| Buffalo, N. Y. | Greensboro, N. C. | Pierce, Fla. |
| Cartaret, N. J. | Havana, Cuba | Port Hope, Ont., Can. |
| Cayce, S. C. | Henderson, N. C. | Savannah, Ga. |
| Chambly Canton, Quebec, Can. | Montgomery, Ala. | Searsport, Maine |
| Charleston, S. C. | Nat. Stockyards, Ill. | South Amboy, N. J. |
| Cincinnati, Ohio | Norfolk, Va. | Spartanburg, S. C. |
| | | Wilmington, N. C. |

The AMERICAN AGRICULTURAL CHEMICAL Co.

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SALES OFFICES

| | | | |
|-------------------|-------------------|---------------------------|-----------------------|
| Alexandria, Va. | Columbia, S. C. | Montgomery, Ala. | Pierce, Fla. |
| Baltimore, Md. | Detroit, Mich. | Montreal, Quebec, Can. | Port Hope, Ont., Can. |
| Buffalo, N. Y. | Greensboro, N. C. | National Stockyards, Ill. | Savannah, Ga. |
| Cartaret, N. J. | Havana, Cuba | New York, N. Y. | Spartanburg, S. C. |
| Charleston, S. C. | Henderson, N. C. | Norfolk, Va. | Wilmington, N. C. |
| Cincinnati, Ohio | Houlton, Me. | No. Weymouth, Mass. | |
| Cleveland, Ohio | Laurel, Miss. | Pensacola, Fla. | |



U. S. D. A. Opposes Increase in Fertilizer Freight Rates

The U. S. Department of Agriculture in opposing the requested 25 per cent increase in freight rates and charges effective May 15th pointed out that the carriers may expect as large a volume of traffic during the current year in the agricultural field as they had during the preceding year so that, to the extent that their request for a 25 per cent increase in freight rates is based on expected decline in agricultural traffic, their assumptions are incorrect.

The Department also states that the Commodity Statistics by the Interstate Commerce Commission show that in 1944 rail carriers received for transporting approximately 11,000,000 tons of manufactured fertilizer, \$68,500,000; and for transporting approximately 852,000 tons of phosphate rock, \$21,600,000. This amounts to a total tonnage of approximately 12,000,000 tons and a total revenue of \$90,130,000.

They estimated that the manufactured fertilizer and phosphate rock transported by rail during 1945 will be approximately 18 per cent larger than during the preceding year with revenue increases in proportion. They further state that the increases in both manufactured fertilizer and phosphate rock, etc., this year, will exceed those for 1945, or will amount to approximately 20 per cent over 1944. This would produce tonnage of approximately 14,000,000 tons of commercial fertilizer, 1,250,000 tons of phosphate rock, etc., and freight revenue of approximately \$110,000,000 or an increase of \$20,000,000 over 1944. A 25 per cent increase in freight rates would thus add more than \$25,000,000 to the freight bill now paid on commercial fertilizer and phosphate rock.

Obituary

Henry E. Cutts

Henry E. Cutts, vice-president and treasurer of Stillwell & Gladding, analytical chemists, New York City, died in Tenafly, N. J., on May 20th. He was 79 years of age.

Mr. Cutts was formerly a teacher of chemistry at Bowdoin College and was later associated with the Cudahy Packing Co. and the National Lead Co. before joining the staff of Stillwell & Gladding.

Industry Expanding Production Facilities

Fertilizer manufacturers are planning expansion programs to meet growing demands for their products. The National Fertilizer Association has stated, on the basis of reports from members. Plans as reported by various firms, call for new capacity ranging from 10 per cent to 65 per cent of their present facilities.

Since the beginning of the war, the N. F. A. said, manufacturers have been confronted with a succession of difficulties, hampering the execution of building programs. Limitations on the use of building materials and shortages of such materials, labor and transportation have retarded construction activities.

Nevertheless, through increases in the use of labor-saving devices, overtime work and other measures, fertilizer production has steadily mounted. In 1945, it was possible for American farmers to obtain 13,200,000 tons of fertilizer as compared with 7,707,278 tons used in 1939. The 1945 consumption was almost 80 per cent greater than in the average of the five-year period 1935-1939. Demand for fertilizers continues strong. Although the country's total production capac-



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PHOSPHATE ROCK

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CALCIUM PHOSPHATES

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BURLAP AND COTTON BAGS

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Keyed SERVICE!

Fertilizer plants all over the country—large and small—state their needs and we meet them. Large stocks of seasoned materials and ample modern production facilities enable us to make prompt shipments.

TRIPLE SUPERPHOSPHATE

46 to 48% Available Phosphoric Acid

We also manufacture
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Specializing

Nitrogenous Materials

Blood and Fertilizer Tankage

Phosphate Rock

Bone Meals

Dolomitic Lime

(42—44% Magnesium Carbonate)

**SOUTH AMERICAN DRY
RENDERED TANKAGE**

**PEOPLES OFFICE BUILDING
Charleston, S. C.**

ity has consistently exceeded demand, individual manufacturers are seeking to be prepared for new responsibilities.

Building programs would extend over a period of from one to three years. "Some companies have worked out plans for installation of new machinery in established units. Other concerns are planning additional storage space important in enabling them to build up their stocks of materials. Still others are planning arrangements for moving finished products out of their plants over a longer period than the normal "shipping season." This project would call for further cooperation of farmers in buying and storing fertilizer in off-season months.

Some manufacturers explained that carrying out of expansion plans would depend upon indications that the Congress would not approve the pending Hill-Bankhead-Flannagan bills and other measures for putting the Government into the fertilizer business.

Duehrssen Appointed Sales Head of Synthetic Nitrogen Products

Effective June 1st, Werner Duehrssen has been appointed sales manager of Synthetic Nitrogen Products Corporation. He will have his headquarters in the main office of the company at 285 Madison Avenue, New York. The branch office of the company at Charlotte, N. C., will be discontinued. Mr. Duehrssen succeeds J. E. Culpepper, who has resigned to take a position with another company.

Sulphate of Ammonia Ceiling Increase Requested

The first meeting of the Ammonium Sulphate Producers Advisory Committee was held on May 16th in conjunction with OPA officials. The producers urged an increase in the ceiling prices of sulphate of ammonia, ranging from \$4.00 to \$8.00 per ton. It was pointed out that this would relieve the industry of the hardships imposed by rising production costs, and would encourage expansion of production as it is impossible for some pro-

ducers to operate at a reasonable profit, especially those located at a distance from their markets.

OPA has taken the request under advisement and will hold another meeting with a sub-committee of the Advisory Committee, consisting of J. D. Saylor, of the Koppers Co.; F. T. Techter, of the Barrett Division, Allied Chemical & Dye Corp.; J. B. Freeman, of U. S. Steel Corp.; C. S. Edwards, of Nitrogen Products, Inc.

Michigan Fertilizer Sales in 1945 Increase

Sales of fertilizers in Michigan during 1945 totaled 305,564 tons, according to figures compiled by the Soil Science Department of Michigan State College. This is an increase of 15 per cent over 1944. Of the total tonnage, 288,091 tons consisted of mixed fertilizers and 17,473 tons of single materials, almost half of the latter consisting of superphosphate. Sales of ammonium nitrate for direct application amounted to 3,976 tons.

Nineteen grades, all containing at least 20 per cent plant food, were sold during the year. The best sellers were: 2-12-6, 161,330 tons; 3-12-12, 32,777 tons; 2-16-8, 16,064 tons; 0-12-12, 15,724 tons; 3-9-18, 13,905 tons; 4-12-8, 10,644 tons; 0-14-7, 10,235 tons. Spring sales amounted to 214,353 tons and fall sales to 91,211 tons.

Production of Peat in 1945

The production of peat in the United States in 1945 totaled 78,272 short tons, valued at \$600,287, according to reports received by the Bureau of Mines, U. S. Department of the Interior, a substantial increase over the

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1944 output of 57,987 tons, valued at \$524,521. The average value of peat per ton in 1945 was \$7.67, a decrease of 15 per cent from the 1944 value of \$9.05.

Most of the peat sold in the United States is used for soil improvement. Of the sales reported in 1945, 64 per cent was sold for soil improvement; 24 per cent, for use in mixed fertilizers; and 12 per cent, for other uses, including fuel (for the first time in recent years), litter for barns and poultry yards, and as a packing for bulbs, fruits, vegetables and fragile articles. Although peat is used extensively in some European countries as fuel, it has not been used for fuel purposes in this country on a commercial scale because of plentiful supplies of higher-grade fuels. The quantity reported sold for this purpose in 1945 is negligible.

Treated Pastures Furnish Increased Minerals in Grasses

Evidence that the health-giving properties of pasture grasses are improved with fertilizer and lime treatment is seen in results achieved by research at the agronomy farm of West Virginia University at Morgantown.

As pointed out by G. G. Pohlman, head of the department of agronomy at the Agricultural Experiment Station, higher yields and tastier species of plants are not the only good things to come from an adequate program of lime and fertilizer.

Pastures at Morgantown which have been limed show about one and one-half times as much calcium in the herbage as unlimed pastures. This increase, Pohlman states, is partly due to the higher lime content of the bluegrass and white clover, which were more abundant on the limed plots. Analyses showed that the calcium content of bluegrass was two to three times as high as that of poverty grass, and white clover had seven to ten times as much calcium as poverty grass.

It was found also that the bluegrass, clover, and poverty grass plants on the limed area were considerably higher in calcium than the same plants on unlimed areas.

Adding superphosphate to pastures increased the phosphate content of the pasture herbage by 65 per cent. Here again the effect was partly due to the higher percentage of bluegrass and clover, both of which are higher in phosphorus than the native herbage, says Pohlman. It was also noted that phosphate fertilizers increased the phosphorus content of the grasses. The bluegrass on the treated pasture had 54 per cent more phosphorus than that on the untreated pasture, and poverty grass on the treated pasture had 92 per cent more phosphorus than that on the untreated pasture.

Lime and phosphorus are two of the most important mineral elements for livestock. The use of adequate quantities of lime and superphosphate on pastures will insure adequate supplies of these minerals to make strong, healthy animals. This may be the most important effect of pasture treatment, in Pohlman's opinion.

TAYLOR AND WILSON JOIN AMERICAN PLANT FOOD COUNCIL STAFF

(Continued from page 14)

Delta agricultural fraternity, the American Society of Agronomy and Soil Science Society of America.

Both men served in the Armed Forces, Dr. Taylor as a major in the U. S. Army chemical warfare service and Mr. Wilson as a chief petty officer in the U. S. Navy.

Mr. Wilson, a native of Hillsboro, N. C., attended N. C. State College and prior to joining the Navy was for six years director of publications for the N. C. Department of Agriculture at Raleigh, secretary of the N. C. Board of Agriculture, director of publicity for the N. C. State Fair and editor of the *Agricultural Review* (NCDA publication). Previously he served on the staffs of the Winston-Salem (N. C.) *Journal*, the United Press, as news editor of the Lenoir (N. C.) *News Topic* and as assistant agricultural editor of the N. C. State College Extension Service. In addition to his public relations work with the Grange, he was editor of the Washington *Farm Reporter* and moderator on the Grange's "America United" (NBC chain) radio programs.

| | | | |
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Information and references available on request.

AMERICAN POTASH & CHEMICAL CORPORATION

122 East 42nd ST., NEW YORK CITY

Pioneer Producers of Muriate of Potash in America

See Page 20

[THE NITROGEN PROBLEM IN SOIL MANAGEMENT

(Continued from page 9)

climatic conditions and soil management practices? Is the quality of organic matter as important as the type of clay mineral? The chemistry and microbiology of soil organic matter needs intensive study. A high proportion of the available data on carbon-nitrogen relationships has come from laboratory and greenhouse work. The principles and hypotheses developed must be tested in the field under a wide range of climatic conditions. This applied research is time consuming, relative expensive, and requires the proper combination of field and laboratory work. It is of such importance that at least some of it should be initiated on a regional basis.

Direct Use of Nitrogen Fertilizers

An important and growing feature of our soil management systems is the use of nitrogen fertilizers for meeting the crop's nitrogen requirements. The more effective ways of using these fertilizers are rather well known by farmers in many sections of the country. In other sections and for some crops, the best methods have not been developed and farmers knowledge of fertilizer is limited. Nevertheless the direct use of nitrogen fertilizers for crop production is one of the simpler practices in the group of practices relating to nitrogen in soil management.

This direct use of nitrogen, whether in mixed fertilizers or as nitrogen materials, is essentially a supplement to the nitrogen supplied by the soil and cropping system. The extent to which farmers depend on fertilizers to supplement the soil is determined by the nature of the soil, the crop, economic conditions, and other factors. In the intensive trucking and cash crop areas along the Atlantic and Gulf Coasts with soils low in nitrogen, the farmers depend very largely on fertilizer nitrogen to meet the requirements of certain crops. In 1944, 16 Atlantic and Gulf Coast states, not including New York and Pennsylvania, used 12% more fertilizer nitrogen than the nitrogen content of the harvested portion of all nonlegume crops in 1943 as estimated by Stallings (6).

Florida used almost four times as much nitrogen as in the harvested portion of nonlegume crops. This reflects the intensity of agriculture on soils low in nitrogen. Contrast that situation with Ohio and Iowa where a livestock system of farming is dominant and fertilizer nitrogen consumption is equivalent to 11.2 and 0.3%, respectively, of the nitrogen in nonlegume crops. The latter states depend largely on legumes and farm manure for additions of nitrogen. They are recognizing however, that fertilizer nitrogen may have a more important place in their soil management practices.

The use of chemical nitrogen is not incompatible with soil management for efficient and stable production. On the contrary, it is often essential for such production. In many instances the nitrogen problem will not be satisfactorily solved without using all the tools at hand, legumes, manures, crop residues, and fertilizers. The best farmers are those who have the skill to select and use the particular tools best fitted for the job on their farm. They will keep in mind that the job involves the maintenance of good physical properties in the soil as well as supplying adequate amounts of all nutrients.

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To make clearer its use, answers to such problems as the following can be quickly obtained:

How much sulphate of ammonia, containing 20 per cent. of nitrogen, would be needed to give $4\frac{1}{2}$ per cent. nitrogen in the finished product?

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WORLD FERTILIZER SITUATION

(Continued from page 11)

production of phosphate rock could be equivalent to some 4,700,000 metric tons of P_2O_5 . It is estimated that the plant capacity at that time could process 4,000,000 metric tons P_2O_5 .

Basic Slag.—Before the war some 5,250,000 tons of basic slag were produced annually in Europe. Germany's output was about 2,500,000 tons. It would appear that German steel production in the future will be limited to some 30 per cent of the pre-war level. Thus, it can be expected that a similar decrease in German production of basic slag will ensue. From this it can be seen that unless other countries will greatly increase their steel and basic slag production in the future only some 3,560,000 tons will be produced annually in Europe. (Note: 3,560,000 tons of basic slag is roughly equivalent to 430,000 tons of P_2O_5 .)

Summary for Soluble Phosphates.—Thus summarizing the soluble phosphate picture, one may say that in 1949-50 one can expect the following world annual production:

a. 15,700,000 metric tons of phosphate rock (equivalent to about 4,700,000 tons P_2O_5), some of which will be used in industry.

b. The world plant capacity will be sufficient to process for agriculture phosphate rock equivalent to 4,000,000 metric tons of P_2O_5 into soluble forms.

c. Some 3,560,000 metric tons of basic slag could be produced which contains about 430,000 metric tons of P_2O_5 .

d. The total world annual production capacity for phosphatic fertilizer including basic slag will be equivalent to 4,430,000 metric tons of P_2O_5 .

If one compares the indicated and estimated demand figures for 1946-47 for soluble phosphates (5,483,600 metric tons) with the estimated production figures for 1949-50 (4,430,000 metric tons), it will be seen that even in 1949-50 the production of soluble phosphates will not be sufficient as judged from the demand figures in 1946-47.

As was stated in the case of nitrogen, so with phosphates: to improve the general standard of crop production throughout the world, the world annual requirement for phosphates as P_2O_5 would be of the order of 9,000,000 metric tons.

Potash

The following quantities of potash (K_2O) can be expected to be produced if there is a market for this material:

POTASH PRODUCTION

| Country | Potential annual production K_2O 1,000 metric tons |
|----------------|---|
| Chile..... | 12 |
| France..... | 550 |
| Germany..... | 1,700 |
| Palestine..... | 60 |
| Spain..... | 150 |
| U. S. A..... | 800 |
| | <hr/> 3,272 |

If the figure 3,272,000 metric tons is compared with the estimated and indicated demand for potash for 1946-47 (3,346,100 metric tons), it will be noted that the world production as visualized for 1949-50 is a little lower than the demand for 1946-47. Thus the level of world production as visualized for 1949-50 does not permit any increase in the utilization of potassic fertilizers.

The world demand for potash of 3,346,100 metric tons can by no means be considered a high figure. To improve the general standard of crop production throughout the world, the requirement for potash would be of the order of 5,500,000 metric tons.

The Editor Apologizes

Readers of our April 20th issue may have received the impression that THE AMERICAN FERTILIZER had started a Puzzle Department. On pages 18 and 19, the advertisement of St. Regis Paper Company presented Case History No. 4 in their present series. While the statistics on page 18 referred to the packaging of a food product (salt), the description matter on page 19 treated of the handling of poultry grits, which had previously appeared as No. 3 in the series. The correct copy for advertisement No. 4 will be found in the April 6th issue.

Our sincere apologies are offered both to our readers and to the St. Regis Paper Co. In these days of labor shortage, by trying to handle make-up along with his other duties, the editor—like Jove—occasionally nods.

In setting its goals for production of fish products, the U. S. Departments of Agriculture and Interior have included an item of 265,000 tons of fish meal. It was emphasized, however, that every effort should be made to make use of every possible pound of fish products for human food, rather than for animal feed, fertilizer and other related uses.

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A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

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Nitrogen Products, Inc., New York City

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BUYERS' GUIDE

For an Alphabetical List of all the
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Utility Works, The, East Point, Ga.

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Schmaltz, Jos. H., Chicago, Ill.
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Virginia-Carolina Chemical Corp., Richmond, Va.

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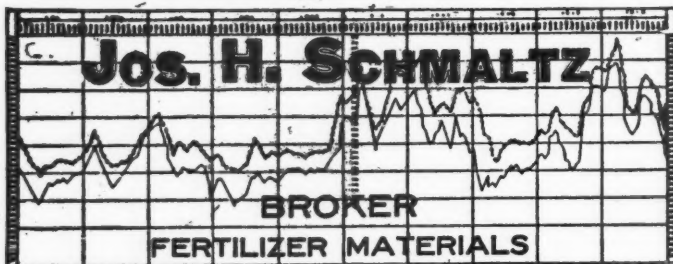
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